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Use and Acceptance of Commercially Frozen Food in Ohio Households

FERN E. HUNT

Ohio Agricultural Research and Development Center

WOOSTER, OHIO

CONTENTS

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[1]Dr Rogers is now at Michigan State University

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FERN E. HUNT

INTRODUCTION

Developments in the frozen food industry have paralleled the technical advances in and availability of refrigeration units for commercial and household use. In 1921, for example, 5000 mechanical refrigerators were produced. In the late 1920's, Birdseye's method of fast-freezing food was developed. By 1937, the annual output of refrigerators had risen to 3 million units (11) and by 1960 51 of every 53 homes in the United States were equipped with mechanical refrigerators (12).

Separate food freezers for the home, however, were not seriously considered until about 1937 (7). According to U. S. Census figures, fewer than 3 percent of urban families owned food freezers in 1950. By 1960, the percentage had increased to 15 (8). At the same time, 64 percent of Ohio farm families reportedly owned freezers (1).

Refrigerators with enlarged freezing compartments were an innovation of the late 1930's. These were accompanied by increasing availability and popularity of frozen food items and were soon followed by combination refrigerator-freezers.

The demand for frozen food products and the array available continue to expand. Total vegetable pack alone increased 15-fold during the period from 1942 to 1962. At present, frozen food display cases in grocery stores are filled with fruit, vegetable, fish, and meat products, plus a large assortment of partially prepared and ready-to-thaw-and-eat items. With increasing consumer income, improvement in food quality, and spreading knowledge of products, still further increases in the use of these convenience foods are predicted (4).

Maintenance of high, or at least acceptable, quality in frozen food from processing to use is an important concern of the frozen food industry. An educational program is carried on continuously by the National Association of Frozen Food Packers to remind those involved in distribution of frozen food of the importance of protection of the products from exposure to unfavorable temperatures (above 0° F.). The ultimate consumer is an important link in the chain of handlers having opportunity to affect the quality of commercially frozen food. However, the consumer is one over whom the industry has little control and about whose practices little information is available.

This study was undertaken primarily to ascertain consumer use and handling practices with commercially frozen food. Information was collected on extent of use and acceptance of various types of frozen food, length of storage of these items in households, kinds of freezing storage space in use, typical storage temperatures, and other practices in acquisition and handling of frozen food which could have implications for quality retention or loss.

This report discusses the survey method and findings on use, acceptance, and related factors. A second report will deal with practices of household consumers in handling commercially frozen food.

PROCEDURE

Information from homemakers was obtained by mailed questionnaires and personal interviews. Samples for both were selected by a random-ordered method to be proportional to the distribution of households among Ohio's densely populated sections, moderate-sized cities and towns, and rural areas. The interview group served in part as a control group with which distribution of the response by mail could be compared and in part as a source of supplementary information, particularly on type of refrigeration used by families for frozen food storage and temperatures maintained.

The Questionnaire

The questionnaire used for both the mail and interview samples was developed to collect information of three general types from consumers: (a) extent of home use and acceptance of commercially frozen food products, (b) care afforded products purchased, and (c) problems encountered in purchasing and using these items. The section on care of frozen food was based largely upon recommendations by Tressler and Evers (9), consumer information released by the U. S. Department of Agriculture (2), and suggestions published by the Ohio Cooperative

Extension Service (5). Some questions suggested by the National Association of Frozen Food Packers also were included.

Pretesting of the questionnaire was done in a pilot study conducted by mail in the metropolitan Columbus, Ohio, area during the autumn of 1961. In light of findings from the pilot study, additional refinements were made in the questionnaire.

The Sample

Two separate random samples of Ohio households were drawn—a large one for use with mailed questionnaires and a smaller one to be used for personal interviews to obtain supplementary information.

A response of about 3,000 usable returns from the mail sample was sought in order to make a sampling ratio for the state of about 1:1,000. According to the response to the preceding pilot study (slightly under 40 percent) this necessitated drawing a list of 8,004 households for the mail sample.

A set of 404 households was drawn for personal interviews to be conducted during the 1-month period in which responses to the mailed questionnaire were accepted. With this number, the sampling ratio was about 1:7,500. This was considered the maximum size sample which the four interviewers available could cover in the time period allowed.

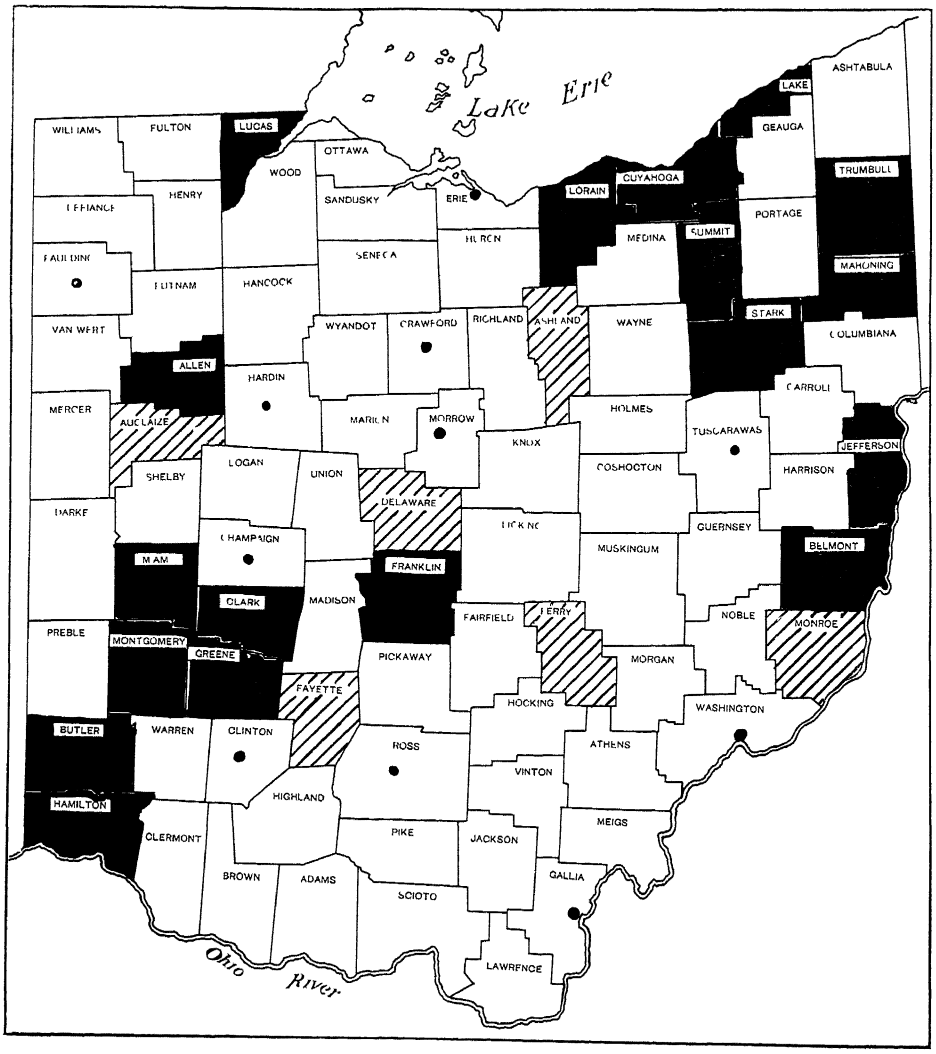

Fig. 1.—Areas included in samples selected for personal interviews and the mailed questionnaire.

Key:

■ Urbanized areas (Central cities with population of 50,000 or more plus urban fringes)

• Other urban (Places with population of between 2,500 and 50,000)

▨ Rural (Counties with population under 50,000 and excluding places of 2,500 or more)

For purposes of selection of the two samples and later comparisons of data, the state population was arbitrarily divided into the three following groups or strata by population density:

Urbanized areas   Central cities and urban fringes with a population of 50,000 or more (referred to in this report as *city*)

Other urban   Places of 2,500 or more but less than 50,000 (referred to in this report as *town*)

Rural   Places under 2,500 and open country

In Ohio, the proportion of the households in each of these classifications, according to the 1960 Census (10), was:

Urbanized areas	59.8 percent
Other urban	15.5 percent
Rural	24.7 percent

The two samples were drawn by a random-ordered method from city and county directories to be proportional to this distribution. The areas covered by the samples are shown in Figure 1.

Collection of Data

Questionnaires were mailed to the sample of 8,004 households on October 17, 1962, and responses postmarked through November 21 were accepted for tabulation. Follow-up reminder cards were sent to all householders on the mailing list within a week after the initial mailing of the questionnaires in an attempt to stimulate returns and preserve the original sample. During this month-long period, the 404 households selected for interviews were visited by pre-trained interviewers. The state was divided into four sections and one interviewer was assigned to work in each section.

Analyses of Data

The information obtained on use and acceptance of the various frozen items was classified by pertinent background factors such as location; type of freezing storage unit available; number in household; family income; and age, level of education attained, and employment of the homemaker.

Tests of association (chi-square) were made to determine whether or not use and acceptance of frozen food items were related to the background factors studied.

FINDINGS

Characteristics of Sample

The samples drawn and responding are shown in Table 1, distributed by the three strata of population density (hereafter referred to as location). Response tended to be associated at the 5 percent level with location. Usable returns were received from slightly larger proportions of the rural and town groups than from the city dwellers. Distribution of responses by location was not related to method of collection of data, however (Table 2).

Since the samples were selected by a random-ordered or systematic sampling method based on population density or location and since distribution of responses was not associated with method of collecting the data, findings from the mailed questionnaire and from interviews are combined as one sample for most of the analyses.

Characteristics of the sample of respondents are presented in Table 3. Seventy-five percent of the responses represented household sizes within the range of two through five members. Annual incomes of between $4,000 and $8,000 were reported on nearly half of the returns. Nearly two-thirds of the homemakers were not gainfully employed and about 70 percent were between the ages of 26 and 55 years. Seventy-one percent of the women were at least high school graduates, including the 22 percent of the sample who had attended college. Sixty-five percent of the families stored the major share of their frozen food purchases in a combination refrigerator-freezer or a separate freezer.

Responses were further classified by type of freezing storage unit in which the major part of purchased frozen food was stored and by location. This

TABLE 1.—Distribution by Location of the Sample Drawn and Responding.

Location	Sample: Drawn		Sample: Responding	
	No	%	No	%
City	5044	60	1724	57
Town	1266	15	473	16
Rural	2098	25	808	27
Total	8408	100	3005	100

$X^2 = 6\ 4991,\ 0.05 > P > 0\ 02.$

TABLE 2.—Distribution of Respondents by Location and Method of Collecting Data (Users and Non-users).

Location	Responses: Mailed Questionnaire		Responses: Interview		Total
	No	%	No	%	
City	1527	57	197	59	1724
Town	418	16	55	16	473
Rural	725	27	83	25	808
Total	2670		335		3005

$X^2 = 0\ 8718,\ 0.70 > P > 0\ 50$

distribution is shown in Table 4. Nearly two-thirds of the rural households, compared to one-fourth of those in cities and nearly one-third of those in towns, had a separate freezer. In most of these households, a conventional refrigerator was used for refrigeration of unfrozen foods and occasionally for temporary storage of a few frozen items. About one-third of the city and town respondents reported use of a combination refrigerator-freezer for storage of the major part of purchased frozen food, compared to only one-tenth of the rural dwellers surveyed.

TABLE 3.—Characteristics of Sample Responding.

Characteristic	No.	%
Number in Household (persons)		
1	35	1
2	637	21
3	553	18
4	632	21
5	439	15
6	232	8
7 or more	201	7
No data	276	9
Total	3005	100
Type of Freezing Storage Space		
Conventional refrigerator	702	23
Combination refrigerator-freezer	857	29
Freezer	1078	36
Rental locker	56	2
Other	133	4
No data	167	6
Total	3005	100
Age of Homemaker (years)		
25 or under	222	7
26 - 35	719	24
36 - 45	812	27
46 - 55	595	20
56 - 65	261	9
No data	396	13
Total	3005	100
Attitude of Homemaker Toward Cooking		
Liked to cook	2475	82
Disliked to cook	248	8
No data	282	9
Total	3005	99
Income (gross annual)		
Under $2,000	70	2
2,000 - 3,999	261	9
4,000 - 5,999	794	26
6,000 - 7,999	618	21
8,000 - 9,999	342	11
10,000 or more	452	15
No data	468	16
Total	3005	100
Employment of Homemaker (hours per week)		
None	1961	65
20 or less	172	6
21 - 34	121	4
35 or more	451	15
No data	300	10
Total	3005	100
Level of Education Attained by Homemaker		
9th grade or less	308	10
10th - 11th grades	278	9
12th grade, including those with specialized training	1484	49
Some college	650	22
No data	285	9
Total	3005	99

The type of freezing storage unit used was not related to level of education of the homemaker nor to her employment status. However, it was significantly related (1 percent level) to income level of the family (Table 5), although trends in ownership were not clearcut.

Use of Commercially Frozen Food

Responses were obtained from 3005 households: 2670 by mail and 335 by interview. Among these households, 149 (5 percent) reported that they used no commercially frozen food. This group was therefore eliminated from discussions of practices with frozen food. Of the 2856 cooperators who said they used commercially frozen food, 2844 provided information on items and quantities used. Information presented in the following section is based upon this group of 2844 households.

The groups of commercially frozen food items most often reported used in the week preceding the survey were regular vegetables, juice concentrates, and potato products. Percentages of households reporting use of these products were 64, 64, and 40 percent, respectively (Table 6). Fish sticks were used by 27 percent of the respondents and other fish and seafood by 26 percent.

The items least often reported used were preseasoned vegetables (11 percent) and a group of miscellaneous prepared items, including pizza, casserole types of mixtures, and others (15 percent). Between 20 and 27 percent of the respondents reported use of one or more of the seven remaining items.

In many households, large enough supplies of fresh meat to last from one pay period to the next were purchased and stored in the various types of freezing spaces in use. In some cases, use of the only available freezing space in this way precluded storage of commercially frozen items.

In the following sections and in Table 7, uses of items in the different frozen food groups considered are summarized in terms of association (as revealed by chi square tests) with selected background factors. Groupings of the frozen food items are defined in Table 11, Appendix.

Use in Relation to Selected Background Factors

Location: Use of all commercially frozen food items except poultry, fish sticks, and other marine products was associated at the 1 percent level with

TABLE 4.—Distribution of Responses by Type of Freezing Storage Unit and by Location.

Type of Freezing Storage Unit	Location							
	City		Town		Rural		Total	
	No	%	No	%	No	%	No	%
Conventional	477	28	119	25	106	13	702	23
Combination refrigerator-freezer	627	36	150	32	80	10	857	29
Freezer	424	25	146	31	508	63	1078	36
Rental locker	9	1	13	3	34	4	56	2
Other*	78	5	14	3	41	5	133	4
No data	109	6	31	7	39	5	179	6
Total	1724	101	473	101	808	100	3005	100

*The type of freezing storage units designated 'other' included combinations of facilities such as two conventional refrigerators, two combination refrigerator-freezers, a combination of these two, or use of a relative's or neighbor's freezer

TABLE 5.—Distribution of Responses by Income Level of Family and by Type of Freezing Storage Unit Used for Commercially Frozen Food.

Annual Income (gross)	Type of Freezing Storage Unit											
	Conventional Refrigerator		Combination Refrigerator Freezer		Freezer		Rental Locker		Other		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
$ 1,999 and less	20	27	17	23	35	47	2	3	1	1	75	101
$ 2,000 to $3,999	66	27	56	23	98	41	8	3	13	5	241	99
$ 4,000 to $5,999	213	29	175	24	307	41	19	3	27	4	741	101
$ 6,000 to $7,999	169	28	202	34	190	32	10	2	23	4	594	100
$ 8,000 to $9,999	66	20	112	34	120	37	4	1	24	7	326	99
$10,000 or more	74	17	159	36	174	40	3	1	30	7	440	101
Total	608	25	721	30	924	38	46	2	118	5	2417	100

$X^2 = 67.212$, $P < 0.001$

location (city, town, rural) of the household. In all cases except for marine products, larger proportions of urban than rural dwellers tended to use frozen products. The less extensive use of some of these commercial items such as vegetables by rural families might be accounted for in part by home production and processing. Fish sticks and other fish and seafood were used by similar percentages of respondents, regardless of location.

Income: Use of frozen fruit, poultry, meat, fish sticks, other fish and seafood, and potpies was not associated with income but income and use of the other eight items were related. For all items with significant chi square values, except for dessert pies and dinners, the probability of the occurrence by chance of values as large as those obtained was 1 or less in 1,000, indicating a very high level of significance. In general, a greater proportion of those reporting incomes of $10,000 or more (or $8,000 or more, in some cases) tended to use all items except fish sticks than was true for the lower income levels. Fish sticks were used by fairly similar percentages of all groups. For each item, the smallest percentages were among those with incomes below $2,000.

TABLE 6.—Use of Frozen Food Items by Households in Ohio During One Week, Autumn, 1962 (Total Households = 2844).

Frozen Food Item	Number of Packages: None	1	2	3 or More	Total Number Users	Per-cent Using
	Number of Responses					
Juice concentrates	1026	214	360	1244	1818	64
Regular vegetables	1030	364	476	974	1814	64
Potato products	1693	502	383	266	1151	40
Fish sticks	2075	511	129	129	769	27
Meat	2075	142	114	513	769	27
Other fish and seafood	2117	454	134	139	727	26
Poultry	2122	366	180	176	722	25
Other baked products	2166	280	159	239	678	24
Potpies	2251	79	111	403	593	21
Dinners	2278	82	143	341	566	20
Fruit	2270	245	161	168	574	20
Dessert pies	2263	322	125	134	581	20
Miscellaneous	2421	220	108	95	423	15
Pre-seasoned vegetables	2532	154	67	91	312	11

TABLE 7.—Significance Levels of Chi Square Values for Use of Frozen Food Items in Relation to Selected Household Background Factors.

Frozen Food Item	Location	Income	Refrigeration	Household Size	Employment of Homemaker	Age of Homemaker	Education of Homemaker	Attitude of Homemaker Toward Cooking
Potato products	**	**	**	**	**	**	**	n.s.
Vegetables, regular	**	**	**	**	n.s.	*	**	n.s.
Vegetables, pre-seasoned	**	**	**	n.s.	n.s	n.s.	**	n.s.
Fruit	**	n.s.	**	n.s.	n.s.	n.s.	**	n.s.
Fruit juice concentrates	**	**	**	**	n.s.	n.s.	**	n.s.
Poultry	n s.	n.s.	**	n.s.	n.s	n.s.	**	n.s.
Meat	**	n.s.	**	n.s.	**	*	n.s.	n.s.
Fish sticks	n.s.	n.s.	n.s.	**	n.s	**	**	n.s.
Other fish products	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	*	n.s.
Dinners	**	*	n.s.	**	*	**	n.s.	n.s.
Potpies	**	n.s.	n.s.	**	n.s.	n.s.	*	n.s.
Dessert pies	**	**	n.s.	**	**	n.s.	**	*
Other baked products	**	**	n.s.	*	*	n.s.	**	n.s.
Miscellaneous	**	**	**	**	n.s.	n.s.	*	n.s.

* Significant at 5 percent level.
** Significant at 1 percent level.
n.s. Not significant.

Number in Household: Use of pre-seasoned vegetables, fruit, poultry, meats, and fish and seafood other than fish sticks was independent of the number of persons in the household. However, use was related to household size (1 percent level) for all other items considered. For all frozen items except meats and potpies, the households of seven or more persons tended to have the lowest percentages for use. For several items, the greatest proportions of users were in the one-person group. If this relatively small group is ignored, the largest percentages of users for most items were within the three to five member household groups.

Type of Freezing Storage Unit: Use was associated at the 1 percent level with kind of frozen food storage unit in the home for commercially frozen potatoes, regular vegetables, fruit, juice concentrates, poultry, and miscellaneous prepared items and at the 5 percent level with meats and pre-seasoned vegetables. The percentages of respondents using these items were greatest among those having a separate freezer. In fact, for all items except the two categories of marine products and frozen dinners, the largest percentages of users tended to be among those having a combination refrigerator-freezer.

The largest percentages of fish stick users tended to be among those having a conventional refrigerator; for other fish and seafood and prepared dinners, those having a separate freezer. If meats, marine products, dinners, potpies, dessert pies, other baked products, and miscellaneous prepared items were purchased for specific uses within a short period of time (or for immediate use), their consumption was independent of the amount of storage space available for frozen food.

The fact that percentages of respondents reporting use of these foods were greater for those having a combination refrigerator-freezer than for owners of separate freezers is consistent with findings that proportionally more urban than rural households used various commercially frozen food products and that ownership of combination refrigerator-freezers was proportionally higher in urban than in rural areas.

Employment of Homemaker: Use of commercially frozen food items was associated at the 1 percent level with employment of the homemaker for potato products, meats, and dessert pies and at the 5 percent level for dinners and other baked products. A larger proportion of those who worked full time than of the other employed groups used frozen meats and frozen pies. More of those who worked 20 hours or less per week used other baked products. Equal proportions of these two groups (full time and 20 hours or less) used dinners.

Although differences were not always significant, for all but three items, the smallest percentages of respondents reporting use of frozen food items were among the women who were not gainfully employed. These excepted items were fruit, fish sticks, and other fish and seafood.

Age of Homemaker: The only frozen food items for which use was associated with age (at least at the 5 percent level) were dinners, potatoes, fish sticks, regular vegetables, and meat. The largest percentage of users of prepared dinners was for homemakers in the 46 to 55 year age group and the smallest was in the

26 to 35 year age group. Frozen potato products were used by a larger percentage of those in the 36 to 45 year group. For this product, as age increased, proportions of users declined sharply. Households in which the homemaker was under 35 years had the highest percentage of users of fish sticks. Regular vegetables were used by a greater proportion of those over 25 years than under this age.

In general, more homemakers in the 46 to 55 year group than in other age categories tended to purchase the pre-seasoned vegetables, dinners, and miscellaneous prepared items. Several reasons might be advanced for this observation. Possibly at this stage in the family life cycle there are fewer in the household or more money may be available to spend for convenience foods. Perhaps women of this age have more time to shop and notice new products. They may have more interest in trying newer items or they may appreciate the time and work-saving features.

The smallest percentages of users of regular and pre-seasoned vegetables, fish and seafood other than fish sticks, dessert pies, other baked products, and miscellaneous prepared items tended to be in the group of respondents 25 years of age and under.

Education of Homemaker: Use of all frozen items except meats and dinners was associated at least at the 5 percent level with level of education attained by the homemaker. The highest percentages of users of potato products, regular and pre-seasoned vegetables, fruit, fruit juice, fish and seafood other than fish sticks, and baked products were among those with the highest levels of education. Conversely, the lowest percentages using these items were among those at the lowest level of education. Those with 10th to 11th grade educations tended to be the top users of all other items.

Attitude of Homemaker Toward Cooking: Among the women supplying information on use, nearly 10 times as many reported that they liked to cook as did not like to cook. Like or dislike of cooking was not significantly associated with use of any frozen food item except dessert pies. With this item, use or non-use was not associated with attitude but extent of use was significant at the 5 percent level. A larger proportion of users of this product who disliked to cook than of those who liked this task used only one frozen pie.

Family Acceptance of Commercially Frozen Food

Results of other studies (3, 6) have shown that in two-thirds or more of the households, the homemaker does the shopping for food. In her role as food buyer, her opinion of food likes and dislikes of household members is likely to influence selection of purchased items for household use.

In this study of consumer practices with frozen food, respondents were asked to indicate whether or not the members of the household as a whole liked, disliked, or had never tried specific groups of frozen food items. Distribution of these responses by groups of items is shown in Tables 8 and 9.

In general, about two-thirds of those responding to the questionnaire provided answers on acceptance by the household of frozen food items listed. The personal interviews indicated that failure to respond in some cases may have been due to indecision on the part of the homemaker about reactions of family members.

TABLE 8.—Distribution of Responses Related to Acceptance of Commercially Frozen Food by Groups of Frozen Food Items.

	Responses				
	Like		Dislike		
Frozen Food Groups	No.	%	No.	%	Total
Fruit juice concentrates	2032	97	58	3	2090
Vegetables, regular	2124	95	110	5	2234
Fruit	1533	93	116	7	1649
Meat	1468	93	104	7	1572
Poultry	1512	93	108	7	1620
Other baked products	1221	90	131	10	1352
Other fish products	1349	90	154	10	1503
Dessert pies	1159	87	179	13	1338
Potatoes	1690	86	272	14	1962
Miscellaneous	818	83	162	17	980
Fish sticks	1286	77	380	23	1666
Potpies	1136	74	389	26	1525
Vegetables, pre-seasoned	541	72	214	28	755
Dinners	968	67	470	33	1438

TABLE 9.—Distribution of "Have Never Tried" Responses by Groups of Frozen Food Items.

	Responses		
	Total	Have Never Tried	
Frozen Food Groups	No.	No.	%
Vegetables, pre-seasoned	1618	863	53
Miscellaneous	1577	597	38
Other baked products	1743	391	22
Dessert pies	1697	359	21
Dinners	1703	265	16
Meat	1834	262	14
Poultry	1872	252	13
Other fish products	1712	209	12
Potatoes	2223	261	12
Potpies	1728	203	12
Fruit	1837	188	10
Fish sticks	1795	129	7
Fruit juice concentrates	2149	59	3
Vegetables, regular	2272	38	2

TABLE 10.—Significance Levels of Chi Square Values for Acceptance of Frozen Food Items in Relation to Selected Household Background Factors.

Frozen Food Item	Location	Income	Refrigeration	Household Size	Employment of Homemaker	Age of Homemaker	Education of Homemaker
Potato products	n.s.	n s.	n.s.	n.s.	n.s.	n.s.	n.s.
Vegetables, regular	n.s.	n.s.	n.s.	n.s.	n.s.	**	*
Vegetables, pre-seasoned	n.s.	n.s.	n.s.	n.s.	*	n.s.	n.s.
Fruit	n.s.	n.s.	n.s.	n.s.	n.s.	*	n.s.
Fruit juice concentrates	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	**
Poultry	n.s.	n.s.	**	n.s.	n.s.	n.s.	n.s.
Meat	n.s.	*	**	n.s.	n.s.	n.s.	*
Fish sticks	**	**	*	**	n.s.	n.s.	**
Other fish products	**	*	n.s.	n.s.	n.s.	n.s.	n.s.
Dinners	*	**	n.s.	n.s.	n.s.	n.s.	**
Potpies	*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Dessert pies	**	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Other baked products	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Miscellaneous	n s.	*	n.s.	n.s.	*	n.s.	n.s.

* Significant at 5 percent level.
** Significant at 1 percent level.
n.s. Not significant.

Among those who did respond to this section, least familiarity was revealed for pre-seasoned vegetables and miscellaneous prepared items. At the time of this survey, pre-seasoned vegetables were a relatively new item on the market. Fifty-three percent of the households had never tried these items and 38 percent had never tried any of the miscellaneous products. Dessert pies and other frozen baked products were also fairly high on the list of unfamiliar items. Greatest familiarity and acceptance were indicated for frozen regular vegetables and juice concentrates.

Acceptance of the various groups of frozen food, as indicated by like and dislike responses, was tested for association with selected background factors of the households. These findings are summarized in Table 10 and discussed in the following section.

Location: Acceptance was significantly related to location of the household (rural, town, or city) for fish sticks, other fish and seafood products, dinners, potpies, and dessert pies. In all of these cases, larger proportions of the city dwellers than of rural families disliked the products. For all groups of frozen food items except poultry, however, larger proportions of rural respondents than expected had never tried them.

Income: Acceptance and gross annual income were significantly associated (at least at the 5 percent level) for fish sticks, dinners, meat, other fish and seafood, and miscellaneous prepared items. This was not true for the other 10 items.

Larger proportions of those with incomes of $10,000 or more than of other groups disliked foods in the miscellaneous products group. Those with incomes at or above $8,000 tended to dislike fish sticks and prepared dinners. Those in the $8,000 to $9,999 bracket tended to dislike other frozen marine products and meat. On the other hand, those with incomes below $6,000 were the respondents tending to like frozen prepared dinners.

Refrigeration: Acceptance of commercially frozen poultry and meat was associated at the 1 percent level with type of freezing storage unit and for fish sticks at the 5 percent level. Larger proportions of the respondents having a conventional refrigerator than of those owning a separate freezer reported that members of the household disliked the meat and poultry products. On the other hand, fish sticks were disliked by smaller proportions of those owning a conventional refrigerator than of those owning a combination refrigerator-freezer. Like or dislike by the family for other frozen items was not associated with type of refrigeration.

In general, the proportion of respondents who had tried given items was greater for those having a combination refrigerator-freezer and less for those having conventional refrigerators or separate freezers.

Employment of Homemaker: Employment of the homemaker and acceptance of frozen food items were not associated except for pre-seasoned vegetables and miscellaneous prepared products. Those who worked full time tended to like the pre-seasoned vegetables and smaller proportions of those employed 20 hours or less disliked items in the miscellaneous group.

Trial of two items was also related to employment. Relatively small proportions of those employed full time had never tried pre-seasoned vegetables. Relatively large proportions of those employed part or full time had never tired commercially frozen meats.

Age of Homemaker: Like or dislike of frozen food items was associated with age of the homemaker at least at the 5 percent level for regular vegetables and for fruit only. Proportions of the group of respondents 25 years or younger who disliked these vegetables were larger than for the group over 45 years of age. On the other hand, both groups tended to like fruit.

Trial of frozen poultry, potpies, other fish and seafood, and miscellaneous products was associated with age of the homemaker. In general, significance here was usually due to the large proportion of the youngest group (those 25 or under) who had never tried the item.

Education of Homemaker: Level of education attained by the homemaker was related to like or dislike of regular vegetables, juice concentrates, meat, fish sticks, and dinners. Smaller proportions of those who had attended college than of those with a 12th grade education or less disliked regular vegetables and fruit juice concentrates. The reverse was true for prepared dinners, fish sticks, and meats.

Relatively small proportions of those who had attended college had never tried potatoes, vegetables (regular and pre-seasoned), juice concentrates, dessert pies, potpies, and items in the miscellaneous group. On the other hand, a larger proportion of this group than of those with less education had never tried commercially frozen meats.

Number in Household: Like or dislike of frozen food items was associated with number of persons in the household only in the case of fish sticks. This item tended to be less popular in households having three or fewer persons than in those with four or more persons.

Trial of four frozen products was associated with household size. A relatively high proportion of the households reporting two or fewer members had never tried fish sticks. Proportions of families with six or more members who had never tried prepared dinners, potpies, or miscellaneous prepared items were also high.

Comparison Between Use and Acceptance Responses

Correlations between use and acceptance responses for various groups of frozen food items were not computed. Some comparisons were made, however, between percentages of these responses in different categories.

Location: For every group of frozen food items except marine products, higher percentages of urban than rural respondents reported use. Percentages of urban and rural cooperators indicating that their families liked specified groups of frozen foods were similar, however, for half of the 14 groups of items. They were higher for urban cooperators for only three groups of items—dessert pies, poultry products, and miscellaneous prepared products.

Income: For most of the groups of items considered, income level was a factor in use but not in acceptance. In nearly every case, as income level increased, the percentage of users increased, although the association was not always significant. Exceptions to increased percentages of users with increased income included poultry products, fish sticks, and dinners.

An inverse relationship between income and acceptance of dessert pies and potpies was noted.

The group of respondents reporting incomes of less than $2,000 a year had the lowest percentages for use for all items considered but the highest percentages for acceptance for more than half of the items. Nearly half of the cooperators in this income classification were 56 years of age or older and it is probable that many were reporting retirement incomes.

Employment of Homemaker: For most products except frozen juice concentrates and the two groups of marine products, percentages of respondents reporting use were higher among those homemakers employed full or part time than among those not gainfully employed. Differences were significant in only a few cases. On the other hand, for most groups of products, acceptance percentages were similar among employed and nonemployed cooperators.

Age of Homemaker: No particular trend with age was evident in use of fruit, poultry, and dinners. For potato products, fish sticks, and meats, the percentages of users tended to decrease with age of the homemaker. Percentages of users of fruit juice and potpies were similar and higher among age groups below 56 years than above. For most other items, percentages of users tended to increase with age level.

For half of the frozen items, no trends for age and acceptance were noted. For dessert pies, dinners, potpies, and the two groups of marine products, acceptance tended to increase with increasing age of the homemaker. This trend was modified to some extent for potato products and vegetables, regular and pre-seasoned. Percentages of respondents reporting that members of the household liked these items were lowest for those under 26 years of age and were relatively constant above this age level.

Education of Homemaker: For all items, the highest percentages of users were among either the group of respondents who had completed the 10th or 11th grade or who had attended college. Percentages were similar in these two groups for pre-seasoned vegetables and fruit. The percentages increased as level of education increased in the case of the following items: potato products, regular vegetables, fruit juice concentrates, fish and seafood other than fish sticks, baked products other than dessert pies, and miscellaneous prepared items.

For most items, on the other hand, differences in percentages of families liking specific groups of frozen items were slight among the different levels of education of the homemaker. Slightly higher percentages of respondents in the groups at higher education levels than at the lower levels tended to like both regular and pre-seasoned vegetables, potato products, fruit juice concentrates, fruit, and baked products other than dessert pies. The reverse was true for potpies, dinners, dessert pies, meats, and the two groups of marine products.

Cooperators' Comments Relating to Acceptance and Use of Frozen Food

Space was provided on the questionnaire for respondents to write in comments about the frozen food items which they rated as liked, disliked, or never tried by their families. These are summarized in Table 12, Appendix. Relatively few statements were written but among those received, convenience was the most often repeated favorable attribute of frozen food items. For regular vegetables, fresh flavor was mentioned nearly as often as convenience.

Among the unfavorable comments, factors most often listed included cost, dissatisfactions with flavor or texture, or both.

Opinions of Respondents about Relative Costs and Convenience of Frozen Food and Other Market Forms of Food

Costs: Use of commercially frozen food may be related to a number of factors. Among these are personal preferences for different foods and for the eating qualities of frozen products vs. fresh items or those preserved by means other than freezing. In addition, opinion about comparative costs of various forms of a food product may influence purchases.

In this study, respondents were given an opportunity to indicate their opinions about costs and convenience of frozen food in general in comparison to canned food or fresh food in season. The following distribution of opinion was found regarding relative costs of frozen and canned items: 7 percent considered frozen food less expensive, 47 percent thought the two forms were about equal in price, 41 percent believed frozen food more expensive, 3 percent were undecided, and 3 percent gave no answer.

Distribution of opinion about comparative costs of frozen food and fresh food in season was somewhat different from the above. The percentage believing the two forms of food to be about equal in price was decreased and the percentages considering frozen food less expensive and more expensive both increased. The percentages were as follows: frozen food less expensive, 14 percent; frozen and fresh items about equal, 32 percent; frozen food more expensive, 46 percent; undecided, 3 percent; and no response, 5 percent.

Further breakdown of responses in relation to background factors for households is given in Tables 13 and 14, Appendix.

Tests of association were made of opinion about relative costs of frozen food and canned food or fresh food in season with various background factors. Opinion was not related to number of persons in the household or to employment of the homemaker. It was significantly associated with location, gross annual income, and education and age of the homemaker.

The proportions of respondents rating frozen food as more expensive than the other two market forms tended to be lowest for those over 45 years of age and those under 25 years, those with ninth grade educations or less, those with the lower incomes, and those living in rural areas. In other words, larger proportions of these respondents considered frozen food to be about the same or less expensive than canned items or fresh food in season. Cooperators considering frozen food to be more expensive than the other two market forms tended to be those with the higher levels of education and income, those living in heavily populated areas, and those between ages 26 and 45.

Convenience: In regard to the relative convenience of using commercially frozen food and canned food in the home, 14 percent of the respondents reported they considered frozen food less convenient, 39 percent considered the two forms about equally convenient, and 42 percent considered frozen food to be more convenient. About 1 percent of the sample was undecided and 4 percent did not respond to the question.

The distribution of responses differed considerably from the foregoing when relative convenience of frozen food and fresh food in season was compared. Nine percent of the women reported they found frozen food less convenient than fresh food in season, 18 percent considered the two forms about equally convenient, and 64 percent found frozen food more convenient. One percent of the sample was undecided and 7 percent failed to answer.

SUMMARY AND CONCLUSIONS

Acceptance, use, and handling practices with commercially frozen food were investigated by mail and by interviews among Ohio households in the autumn of 1962. Responses on acceptance and use from 3,005 households in a stratified random sample of 8,408 households (36 percent return) were analyzed for association with selected household characteristics. Distributions of returns and the original sample among rural and urban groupings corresponded reasonably well. Validity was further checked by comparison between distributions of mail and interview cooperators.

Ninety-five percent of the respondents reported at least occasional use of commercially frozen food items. Of these, 2,844 provided usable information on use and acceptance.

At the time of the survey, the proportion of rural households using frozen items, and particularly those which could be home-produced, was significantly lower than that for urban households. Higher percentages of rural than of urban respondents said their families liked most commercially frozen food, had separate freezers for storing, and tended to consider commercially frozen food less expensive than items canned or fresh in season. Two factors limiting use were variety of products available in some areas of the state and income. Use was limited also by the number of persons in the household. However, in analysis of opinion about relative costs of fresh, canned, and frozen food, household size was less important to a favorable opinion toward frozen food than were location, income, and education and age of the homemaker.

Ownership of combination refrigerator-freezers was greatest in urban areas and higher than for conventional refrigerators. Percentages of users of most commercially frozen food items were highest for those having this type of equipment. Purchased frozen food items frequently shared the freezing storage space with short-term supplies of meat, baked goods, and other items frozen by the homemaker. Such use of the freezing space occasionally placed some limitation on quantities of commercially frozen items which could be accommodated.

Commercially frozen items which would have required additional time and trouble if prepared from basic ingredients (for example, potato products, dinners, dessert pies, and other baked products) were the ones tending to be associated with employment of the homemaker.

Use of most frozen food items was related to age and level of education of the homemaker. However, the most highly educated and the younger homemakers were not necessarily those for whom commercially frozen food items had the most appeal.

Certain groups of commercially frozen food items appeared to be more prestigious than others, according to acceptance responses. Fish sticks, potpies, and dinners, were toward the bottom of the list. Nevertheless, these items held their own among items reported used.

In general, commercially frozen food items were well-accepted by the sample. Income level, location, (urban or rural), and type of storage accommodations were stronger predictors of consumer behavior in the market place with regard to frozen food purchase than was household acceptance.

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APPENDIX

TABLE 11.—Groupings Used in Classifying Frozen Food Items.

Grouping	Description	Grouping	Description
Vegetables	A: Potatoes (French fries, puffs, patties, etc.) B: Regular (peas, corn, green beans, spinach, lima beans, etc.) C: Sauced, seasoned, or boil-in-bag items (generally referred to as pre-seasoned)	Protein-rich items	Poultry, uncooked: chicken, turkey, etc. Meats, uncooked Fish sticks Other fish and seafoods
Fruit	Berries, peaches, etc. Fruit juice concentrates: orange, grape, etc.	Other	Prepared dinners Potpies: meat, seafood, or poultry Dessert pies Other baked products: rolls, cakes, waffles,etc. Miscellaneous prepared foods: pizza, soup, macaroni and cheese, chicken a la king, etc.

TABLE 13.—Distribution of Opinion of Respondents Concerning Relative Costs of Commercially Frozen Food and Canned Food by Selected Background Factors.

Background Factors	Frozen Food Less Expensive		Costs About the Same		Frozen Food More Expensive		Total
	No.	%	No.	%	No.	%	
Location							
City	94	6	751	47	699	44	1544
Town	40	9	220	49	178	40	438
Rural	63	8	374	50	285	38	722
Total	197	7	1345	48	1162	42	2704
Number of Persons in Household							
3 or fewer	88	8	541	50	447	42	1076
4 to 6	78	6	591	49	526	44	1195
7 or more	12	6	89	48	86	46	187
Total	178	7	1221	50	1059	43	2458
Income (gross annual)							
$ 1,999 or less	4	4	31	35	17	19	52
2,000-3,999	26	11	130	56	75	32	231
4,000 5,999	50	7	370	53	277	40	697
6,000-7,999	31	5	275	48	266	46	572
8,000-9,999	18	6	146	47	147	47	311
10,000 or more	31	7	186	44	204	48	421
Total	160	7	1138	49	986	42	2284
Education of Homemaker							
9th grade or less	36	14	129	52	82	33	247
10th to 11th grade	20	8	130	56	84	36	234
12th grade and specialized training	74	5	682	50	597	44	1353
Some college	43	7	277	45	292	48	612
Total	173	7	1218	50	1055	43	2446
Age of Homemaker (years)							
25 or under	14	7	102	53	77	40	193
26 to 35	44	7	304	46	308	47	656
36 to 45	43	6	351	47	346	47	740
46 to 55	42	8	280	52	217	40	539
56 to 65	23	10	120	52	87	38	230
66 or over	11	12	63	66	22	23	96
Total	177	7	1220	50	1057	43	2454
Employment of Homemaker (hrs./wk.)							
None	124	7	886	51	737	42	1747
20 or less	9	5	77	47	79	48	165
21 to 34	5	4	57	51	49	44	111
35 or more	38	9	190	46	183	44	411
Total	176	7	1210	50	1048	43	2434

TABLE 12.—Summary of Comments Related to Acceptance of Frozen Food Items.

Frozen Food Group	Pro Comment	No.	Con Comment	No.
Potatoes	Convenient	16	Expensive	18
	Better than canned	3	Too soft after cooking	11
	Economical	1	Lose flavors	10
			Off flavors	7
			Soak up fat	3
			Poor texture	3
Vegetables, regular	Convenient	8	Tasteless	6
	Fresh flavor	5	Off flavors (raw, woody)	6
	Better than canned	3	Too mature	5
	Tender	1	Expensive	4
Vegetables, pre-seasoned	Convenient	4	Expensive	31
	Economical	2	Dissatisfaction with sauce, seasoning or texture (pasty, too rich, over-seasoned)	7
			Poor flavor	3
			Inconvenient	2
Fruit	Convenient	5	Sloppy, mushy	19
			Expensive	11
			Poor flavor	10
			Color darkens	6
Fruit juice concentrates	Convenient	12	Expensive	7
	Like flavor	3	Too acid	2
Poultry	Convenient	7	Dry	4
			Loses flavor	4
			Bones dark	2
			Don't trust freshness and quality	1
			Looks unappetizing	1
Meat	Convenient	7	Poor flavor	6
	Economical	3	Expensive	5
			Don't trust freshness and quality	1
Fish sticks	Convenient	8	Poor flavor (tasteless, not fresh)	15
			Expensive	6
			Dislike coating	3
Other fish and seafood products	Convenient	7	Tasteless or poor flavor	11
			Expensive	4
			Watery, stringy	2
			Dislike cooking odor	1
Dinners	Convenient	23	Expensive	38
			Portions too small	21
			Poor flavor	16
			Don't like assortment included in plate	2
			Dry	2
Potpies	Convenient	11	Not enough meat	10
			Crust pasty	10
			Not satisfying	6
			Expensive	5
			Prefer 1 crust	4
			Lacks flavor	4
			Too highly seasoned	2
Dessert pies	Convenient	6	Expensive	21
			Poor crust	5
			Too little filling	4
			Pie small (package misleading as to size)	1
Other baked products	Convenient	7	Expensive	6
	Economical	2	Dry out	3
	Improves moistness of cake	1	Soggy	2
			Rolls defrost and rise before purchaser reaches home	1
Miscellaneous	Convenient	7	Expensive	23
			Unsatisfactory flavor, seasonings	2

TABLE 14.—Distribution of Opinion of Respondents Concerning Relative Costs of Commercially Frozen Food and Fresh Food in Season by Selected Background Factors.

Background Factors	Frozen Food Less Expensive		Costs About the Same		Frozen Food More Expensive		Total
	No	%	No	%	No	%	
Location							
City	209	14	496	33	812	54	1517
Town	63	15	165	39	199	47	427
Rural	136	19	256	36	314	44	706
Total	408	15	917	35	1325	50	2650
Number of Persons in Household							
3 or fewer	155	15	387	37	500	48	1042
4 to 6	177	15	396	34	607	51	1180
7 or more	27	15	53	29	104	56	184
Total	359	15	836	35	1211	50	2406
Income (gross annual)							
$ 1 999 or less	12	24	21	42	17	34	50
2 000 3 999	29	13	96	43	100	44	225
4 000 5 999	126	18	236	34	321	47	683
6 000 7 999	75	13	180	32	316	55	571
8 000 9 999	28	9	99	33	175	58	302
10 000 or more	68	16	130	31	216	52	414
Total	338	15	762	34	1145	51	2245
Education of Homemaker							
9th grade or less	103	34	96	32	99	33	298
10th to 11th grade	40	17	89	38	108	46	237
12th grade and specialized training	195	15	450	34	680	51	1325
Some college	79	13	192	32	325	55	596
Total	417	17	827	34	1212	49	2456
Age of Homemaker (years)							
25 or under	35	18	64	34	90	48	189
26 to 35	87	14	199	31	355	55	641
36 to 45	97	13	245	33	391	53	733
46 to 55	94	18	203	39	228	43	525
56 to 65	31	14	84	37	114	50	229
66 or over	17	18	40	43	35	38	92
Total	361	15	835	35	1213	50	2409
Employment of Homemaker (hrs /wk)							
None	262	15	595	35	854	50	1711
20 or less	19	12	46	29	93	59	158
21 to 34	14	12	34	30	65	58	113
35 or more	62	15	151	37	190	47	403
Total	357	15	826	35	1202	50	2385